

ABSTRACT OF THE DISCLOSURE

A method and apparatus for thermally conducting heat from a semiconductor device, namely, a flip-chip assembly. In one embodiment, a heat sink, such as a diamond layer having openings therein, is provided over a surface of a semiconductor device. Conductive pads are formed in the openings to be partially contacting the diamond layer and to electrically communicate with the semiconductor device. The heat produced from the semiconductor device and thermally conducting through the conductive pads is thermally conducted to the heat sink or diamond layer and away from the interconnections, *i.e.*, solder bump connections, between a semiconductor device and a carrier substrate in a flip-chip assembly. As a result, thermal fatigue is substantially prevented in a flip-chip assembly.

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